

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

Project

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Author

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PROGRAM OF WORK FOR CALENDAR YEAR 1940

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PROGRAM OF WORK

**UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
Division of Forest Insect Investigations**

Station: Coeur d'Alene, Idaho

Period: Calendar Year 1940

Leader: James C. Evenden

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The following investigative and cooperative service activities are submitted as the program of the Coeur d'Alene Laboratory for the year 1940. This program is founded upon existing personnel and past allotments and is planned to answer the essential requirements of the laboratory projects. Changes in personnel or allotments may require some adjustments in the following schedule of activities.

The problems of the mountain pine beetle will receive the major portion of the research time of the laboratory. Forest insect surveys will be extended to as large an area as funds will permit. Requests for entomological service requiring field activities will be met to the limitation of personnel.

RESEARCH LINE PROJECT NO. h-1-1

INVESTIGATIONS ON THE HABITS AND THE DEVELOPMENT OF CONTROL METHODS FOR BARK BEETLES ATTACKING FOREST AND SHADE TREES.

Project No. h-1-1 (1)

Studies of the character of individual trees and forest stands for the purpose of developing a basis for classifying such trees or stands as to their susceptibility to attacks by bark beetles.

During the coming season the work on this project will be confined to the susceptibility of white pine stands to outbreaks of the mountain pine beetle. White pine forests are a temporary forest type, which under certain environmental conditions are replaced by more permanent species. With a knowledge of the factors contributing to the susceptibility of these timber stands, provision can be made for cutting prior to the occurrence of this condition, or if that is not feasible an increased

protection from insect attack would need be available. During future insect surveys, data will be obtained as to the age, average diameter, stand density, and proportion of species of all white pine stands as an approach to the solution of this problem. It is believed that these fundamental data will provide a basis from which subsequent research will permit the selection of white pine stands which are vulnerable to attacks of the mountain pine beetle.

Project No. h-1-1 (3)

The biology and control of the mountain pine beetle.

No further work is required on this project in relation to the biology of the mountain pine beetle in white pine. However, in whitebark pine, which occurs at higher elevation along the Continental Divide, more information is required on such items as parent adult emergence and the duration of the development period. To obtain these data new attacks will be induced under controlled conditions, which will provide information as to parent adult emergence as well as the period of time required for the subsequent brood to mature and emerge. Other brood data will be obtained at the time these trees are examined.

Project No. h-1-1 (5)

Investigation of the use of penetrating lethal oils in the control of bark beetles.

Past experiments have demonstrated the effectiveness of certain formulae in destroying broods of the mountain pine beetle beneath the bark of lodgepole pine. An experimental control project using this spray as the means of treatment, was instituted on the Grand Teton

National Park in June 1939. It was expected that from this project data would be available which would determine the practical value of this proposed method of control. However, due to unfortunate circumstances associated with this operation such conclusions could not be drawn. This project will be repeated during the coming season, and steps taken to provide those data which will determine some of the economic values of these sprays.

During May 1940 a series of small white pine logs infested with broods of the mountain pine beetle will be treated with several of the formulae that have given the best results. These experiments will be conducted under controlled conditions both before and after treatment, with steps taken to determine the actual mortality obtained with each formula tested. The status of the brood in each log at the time of treatment will be determined by the examination of a 6-inch strip at each end. The actual amount of spray applied to each log will be controlled, and after treatment the logs will be placed in cages to determine the emergence of all insects. Outstanding results obtained from these tests will be retested in the treatment of infested trees.

Project No. h-1-1 (6)

Investigation on the practicability of increasing the percentage of control in bark beetle infestations by fostering parasites and predators during control operations.

From data now available the population of parasites and predators for an entire tree can be determined from a basal examination with a good degree of accuracy. These data would provide for the elimination from control projects, of certain trees containing definite numbers of beneficial insects, if the relative values of the different species were known.

Without this information it is impossible to establish a percentage of parasitism where the treatment of a tree becomes more harmful than beneficial. Although no definite assignment has been made for the coming season, some work can be conducted in the near future in order to determine the potential value of these different insects as encountered at the time of control operations.

Project No. h-1-1 (7)

The biology and control of secondary bark beetles that under favorable conditions become a primary importance.

The danger of abnormal accumulations of ponderosa pine slash, logs, wood cuttings, etc., as contributing to local sporadic outbreaks of the Oregon engraver beetle (Ips oregoni) is fully appreciated. The greater danger of such accumulations of host material during periods of deficient rainfall as contributing towards larger and more destructive outbreaks of this insect is also understood.

Cooperation with the Forestry Department of the Soil Conservation Service at Spokane, Washington, in studying the relation of woodlot thinning to subsequent damage by secondary bark beetles is planned for the coming season.

Project No. h-1-1 (8)

The protection of individual pine trees of high value from bark beetles.

Experiments have failed to reveal any satisfactory method of protecting lodgepole pine trees from the attacks of the mountain pine beetle except through the use of mechanical barriers. Although a few more high-valued trees around the headquarters buildings of the Grand

Teton National Park may be protected by wire screen during the coming season, it is possible that this year's work will be limited to checking the results obtained by previous treatments.

Project No. h-1-1 (10)

Collection of data on bark beetle populations which not only will be of value in advising regarding control but will be useful in studying the trends of infestation and the causes therefor.

The work at the Coeur d'Alene Laboratory has been concerned with the study of mountain pine beetle infestations in white pine. The scope of this problem is wide, as it must include all of the factors which contribute to it primary objective, which is the prediction of trends of an infestation. Four years of data, obtained from the intensive brood analysis associated with this study, has permitted the compounding of a formula which indicates that changes in the subsequent season's insect population can be predicted with necessary accuracy. With the perfecting of this instrument the need for the institution of control can be accurately determined and the results obtained by such action properly ascertained. Practical tests of this prediction have been made by comparing the estimated change in the insect population to the change in the number of infested trees as indicated by forest insect surveys. Although the results of these tests were quite satisfactory, objections to this method of comparison are as follows:

1. Fluctuations in beetle populations do not always coincide with the changes in the number of infested trees, due to differences in the density of attack and the height of infestation on the bole.

2. As in our extensive forest insect survey there is an allowable error of 10 to 20 percent, the formula for predicting subsequent insect populations should have the same latitude. Although for either action an error of this degree is acceptable, the comparison of one variable with another, as a means of determining^m the accuracy of either, is not a sound procedure.

3. It is further recognized that predictions resulting from the use of this formula may be seriously influenced by such factors as insect control, flights of insects from untreated areas adjacent, and logging operation.

To avoid these objections it is proposed that during the 1940 season experiments be instituted that will establish the effectiveness of this formula in predicting changes in bark beetle populations. Several small, rather well-isolated areas of white pine, varying from 500 to 2,000 acres in area, which are located on the Kootenai National Forest, will be used for this experiment. At the start of this experiment each area will be covered by a 25 percent survey to determine the existing status of the 1939 infestation. The formula will be used to arrive at a prediction as to the status of the insect population in 1940. The area will be resurveyed at the time to determine the accuracy of the prediction. Sufficient breed analysis will be made in each area to permit the correction necessary in providing for a difference in density of attack and the height of infestation. This work will be instituted during May.

In connection with last season's work on the Coeur d'Alene Forest, there are a number of trees that are marked for reexamination, as a

test of predicted brood mortality. There are also a number of trees that have been caged as a means of determining^m the actual emergence. These trees will be examined during June and early July.

RESEARCH LINE PROJECT NO. h-1-3

INVESTIGATION ON THE HABITS AND THE DEVELOPMENT OF CONTROL METHODS FOR INSECTS WHICH BORE THROUGH THE WOOD AND BARK OF LIVING AND FOREST TREES.

Project No. h-1-3 (2)

The biology and control of the locust borer, with special attention to the effects of drought and the possibilities of silvicultural treatments for control.

No work is contemplated for this project during the coming season.

RESEARCH LINE PROJECT NO. h-1-6

STUDIES ON THE RELATION OF CLIMATIC FACTORS, SUCH AS HEAT, GOLD, MOISTURE, ETC., ON FOREST INSECT POPULATION.

Project No. h-1-6 (1)

The effects of low temperatures on bark beetle populations.

Past experiments have demonstrated the ability of overwintering broods of the mountain pine beetle in white pine to withstand the normal occurrences^e of prolonged periods of extreme low temperatures. These experiments have also shown that the cold-hardiness of these insects, which during the summer is at a low ebb, increases as the colder temperatures of fall weather approaches, until a maximum resistance is reached. In the spring this resistance is gradually reduced until summer conditions exist. As these tests were made

with naked larvae, they were subject to a criticism of being conducted under unnatural conditions. The present winter work is directed towards the elimination of this objection.

Starting in October 1939, and at stated intervals throughout the winter, an infested white pine log 24 inches in length and from 13 to 18 inches in diameter has been subjected to a temperature of -30°F . Each of these tests lasts from 36 to 40 hours, with the temperature of the cabinet at the start of the exposure being comparable to conditions to which the log had had been previously subjected. When the temperature beneath the bark is lowered to -30°F , the log is removed and held in a storage at the laboratory insectary until later in the season, when it will be caged to determine the actual emergence. Data from these tests will not be available until June 1940.

RESEARCH LINE PROJECT NO. h-1-8

INVESTIGATION ON THE INJECTION OF CHEMICALS INTO THE SAPSTREAM OF THE TREE FOR THE CONTROL OF BARK BEETLE INFESTATIONS AND FOR THE TREATMENT OF GREEN TREES TO PREVENT INSECT ATTACK UPON THE UTILIZED WOOD.

Project No. h-1-8 (2)

Investigation of methods and of the effectiveness of introducing chemicals into bark-beetle-infested trees for the purpose of killing the insects.

Ten white pine trees infested with the mountain pine beetle were treated with sodium arsenate (5) and ammonium bifluoride (5) in September 1939. As these trees will not be examined until June 1940, further tests of this potential method of bark beetle control can not be planned until these results are known.

RESEARCH LINE PROJECT NO. h-1-13

SURVEYS TO LOCATE AND DETERMINE THE STATUS OF INSECT PESTS OF THE FOREST AND THE GIVING OF ADVICE TO LAND-MANAGING AGENCIES ON PLANNING AND CONDUCTING NECESSARY CONTROL WORK.

Project No. h-1-13 (1)

Surveys to determine the advisability of control in national forests, national parks, Indian lands, and state and private lands.

The extension of this project is contingent upon the funds that are available. On the basis of last years appropriations the following surveys are planned for the coming season.

<u>Forest</u>	<u>Acres</u>	<u>Timber Sp.</u>	<u>Insect</u>
Coeur d'Alene	118,730	White pine	Mountain pine beetle
Kootenai	39,530	" "	" " "
Clearwater	118,280	" "	" " "
Private lands	169,640	" "	" " "
Lewis & Clark	?	Lodgepole pine	" " "
Minidoka	?	" "	" " "

Project No. h-1-13 (2)

Surveys to check upon the results of control work that has been performed.

Surveys in connection with this project will be confined to the Coeur d'Alene and Salmon National Forests, where control projects have been conducted during the present winter.

RESEARCH LINE PROJECT NO. h-1-16

DISSEMINATION OF INFORMATION TO THE PUBLIC ON METHODS OF CONTROLLING FOREST AND SHADE TREE INSECTS; INCLUDING GENERAL INQUIRIES ON THIS SUBJECT.

It is impossible to foresee the requests for entomological service that will be received by this laboratory during the coming season. These requests, which vary from lectures or illustrated talks on forest insects and examination of forest areas to the answering of

questions concerning shade tree insects, will be met as far as the limitation of the laboratory personnel permits.

A few requests for examination of forested areas during the coming season have already been received:

1. Glacier National Park. Fading of Douglas fir foliage--possibly drought or spider mite infestation (Oligonychus americanus).
2. Coeur d'Alene National Forest. Dying of terminals in ponderosa pine plantation. Possibly damage by pine midges. (Retinodiplosis sp).
3. Kanihsu National Forest. Dying of white pine in dense pole stand. Possibly a problem of overstocking.
4. Cabinet National Forest. Dying of white pine in 15-year-old plantation. Result of injury by Pineus pinifoliae.
5. Cabinet National Forest. Dying of ponderosa pine in 15-year-old plantation. Possibly damage by Matsucoccus sp.
6. Kootenai National Forest. Engelmann spruce beetle infestation.
7. Sawtooth National Forest. Tussock moth (Hemarocampa pseudotsugata) infestation. Parasite liberation in 1937.



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